

The fragrance for hair coloring products

Fumio Shibue

(Perfumery Development Research Laboratories, Kao Corp.)

The variety of hair coloring products has been increasing recently. So far, a main role of the fragrance was to cover an unpleasant base smell. However, it will be expected to offer the consumer more comfortable feeling while using or after use them in near future.

1. Introduction

Up until about 10 years ago, hair coloring products have been used for the purpose of "concealing gray hairs" and have formed a relatively consistent market.

With a turn of '90s, young women started to change their hairs into bright-colored ones, so-called "brown hairs" as one of their enjoyments of fashionable hair styles. Since then, the market of hair coloring products for black hairs has been expanding. Today, changing colors of hairs into bright ones or their color tones is widely spreading among people regardless of sexes and ages.

Even for household use, products in new categories such as temporary coloring, partial coloring, and darkening coloring are increasing their sales. Hair coloring products have become

versatile in their kinds, including those having a variety of color tones and those appealing for convenience of application.

In this report, firstly, a fundamental composition of a hair coloring product which gives a large influence on fragrance of the product is described; secondly, a recent transition of the market of hair coloring products for household use is briefly reviewed; and, then, the fragrance is discussed.

2. Classification and characteristics of hair coloring product

Hair coloring products are roughly classified into two groups, namely, those for gray hairs and those for black hairs, in accordance with purposes of usages such that group (1) is for coloring gray hairs to conceal them or allowing them to be less conspicuous and group (2) is for decoration in which natural black hairs are bleached and, then, changed into bright-colored ones or those having a different color tone.

Hair coloring products can also be classified into three groups based on their mechanism, namely, permanent hair coloring products, semi-permanent hair coloring products, and temporary hair coloring products.¹⁾ (See Table 1).

2-1. Permanent hair coloring product

A product which is generally called as "hair color" or "hair dye" falls in this type. Ordinarily, the product is divided into two parts: a component (referred to as "first

component") composed of, for example, a dye, and an alkaline agent, and the other component (referred to as "second component") containing an oxidizing agent. The first and second components are mixed with each other immediately before they are used. Since an oxidative dye is used as a dye, the product is also called as an oxidative hair coloring product.

A main ingredient of the first component is an oxidative dye (dye intermediate) of an aromatic amino compound such as p-phenylene diamine, p-aminophenol, toluene-2,5-diamine, resorcin, m-aminophenol, or m-phenylene diamine. In the first component, in addition to the main component, an alkaline agent, solvent, a treatment component, a surfactant, a stabilizer, etc. are added.

After penetrating into inside the hair, the dye intermediates are bonded with each other by an oxidative reaction to form a color-developing large molecule. Then, the thus-formed color-developing large molecule turns to be an insoluble pigment which is hard to be eluted from the hair. For this account, washing off the color by shampoo is deterred, thereby retaining a coloring effect long. A mechanism of coloring hairs by the permanent hair coloring product is shown in FIG. 1²⁾.

The alkaline agent not only swells the hair and allows the dye intermediates and the oxidizing agent (hydrogen peroxide) to penetrate into inside the hair, but also has a

function of promoting decoloration of the melanin pigment by the oxidizing agent and color-development/coloration by oxidative polymerization of the dye intermediates. As for such alkaline agents, ammonia is usually used. As is well known, ammonia has a strong pungent odor. It gives a large influence on odor to be generated at the time, after the first and second components are mixed with each other, the resultant mixture is applied to hairs and, then, left to stand. As for other alkaline agents, monoethanolamine is mentioned. Although monoethanolamine has no pungent odor, it has a slight amine odor and is inferior to ammonia on the points of coloring performance and an action to hairs.

In the second component, hydrogen peroxide is ordinarily used as an oxidizing agent, and sodium perborate can also be used. The oxidizing agent (particularly hydrogen peroxide) oxidatively polymerizes dye components between themselves while decomposing and decoloring a melanin pigment inside the hair. Hydrogen peroxide is unstable such that it is easily decomposed; therefore, a stabilizer is simultaneously used in many cases. Most of the second components have no pungent odor.

The permanent hair coloring products are in most cases in a liquid or cream state. According to an evaluation by the author of the present report, on condition that same amount of ammonia is compounded, it was felt that the product in the liquid state is more pungent than that in the cream state.

2-2. Bleaching product (hair bleach)

Hair bleach may be considered as a product in which a dye intermediate is removed from the composition of the permanent hair coloring product. The hair bleach has no coloring effect but, in a same manner as in the permanent hair coloring product, swells hairs by an alkali contained therein, allows hydrogen peroxide to penetrate into inside the hair, decompose and decolor melanin. As for forms (referred to also as packagings) of the hair bleach, a two-component type is in the mainstream in the same manner as in the oxidative hair coloring product. However, recently, a product of one-component type in the form of pump spray or pump foam which is solely compounded with hydrogen peroxide and, although being less effective unless repeatedly used, is easy to use is put on the market.

Further, recently, a demand for hi-bleach of three-component type in which one of persulfates such as ammonium persulfate is added to hydrogen peroxide as an accelerator to enhance a decoloring force is increasing.

Since ammonia is ordinarily used as an alkaline agent in the hair bleach, a problem of reducing the pungent odor of the product is pending.

2-3. Semi-permanent hair coloring product

A semi-permanent hair coloring product which is called

also as an oxidative hair coloring product allows an oxidative dye (for example, legal dye: black color No. 401; violet color No. 401; or orange color No. 205) to penetrate into inside a hair to perform coloring and performs hair coloring in an acidic condition of pH 3 to 4. Color rinse and hair manicure belong to this type. Ordinarily, benzylalcohol or N-methylpyrrolidone is used as a penetration accelerator. The dye penetrates into a cortex layer which is in a relatively short distance inward from the cuticle of a surface of the hair, performs ionic bonding with an amino group and hydrophobic bonding with a hydrophobic group inside the hair. Retention period of a coloring effect is about three to four weeks³⁾. (See Table 2).

Since the semi-permanent hair coloring product does not cause a chemical reaction different from the permanent hair coloring product, damage to hairs is small. To contrast, the semi-permanent hair coloring product is high in a penetration force and, when it sticks to skin, it is hard to be washed off in some cases.

Since the semi-permanent hair coloring product does not use an alkaline agent such as ammonia, it has no pungent odor, though having a slight solvent odor; therefore, the semi-permanent hair coloring product can relatively freely be imparted with fragrance.

2-4. Temporary hair coloring product

Many of temporary hair coloring products which contain a pigment and carbon black as main ingredients can conveniently change color tones of hairs such that they are directly attached to hairs. Since the temporary hair coloring product is simply adsorbed to a surface of a hair physically, it can easily be washed off by shampoo.

The temporary hair coloring product is available in many forms, such as aerosol spray, foam, a stick, and mascara. Since the temporary hair coloring product is suitable for partially changing the color of hairs, it is used for a hair retouch for concealing gray hairs, also for hair foundation for changing nuances of colors of black hairs, and further for make-up of colors of hairs.

Since these are prepared by compounding a pigment and other ingredients to, for example, rinse, hair spray, or mascara, no product having a strong base material odor can be seen.

3. Market of hair coloring product

According to shipment statistics of hair cosmetics (see Table 3), market sizes for a shampoo, a rinse, a treatment, a hairdressing and the like which are major categories tend to be, more or less, shrunk, because these products are in respectively matured stages and also being influenced by a trend toward low-priced products in the past few years.

Under these circumstances, nevertheless, shipments of hair color products are steadily increasing and, although a sign of leveling-off was seen in '98, according to shares by categories of hair cosmetics, the hair coloring products hold a share of about 20% next to shampoo which holds a share of 26% (see FIG. 2) and it is expected that the hair coloring products become a more important category in the future.

When hair coloring products for household use are broken down, markets for hair color, and hair manicure which have conventionally been used for gray hairs are relatively consistent over years, while a market for products for black hairs has been expanding from the beginning of '90s. (See FIG. 3). As for reasons for this, it can be said that, firstly, it has become popular that people, particularly among young generations, hairs are decolorized by a bleaching product in order to change them to be bright ones and, then, it has been established that they color their hairs in more brilliant colors and enjoy hair colors as a fashion.

According to a consciousness survey of high-school girls, white-color workers (referred to as salaried men) of 20s of age, and women working in offices (referred to as OL) on hair care and hair color conducted by Japan Soap and Detergent Association conducted in October, 1998³⁾, rates of performing coloring now in practice are 49%/33%/22% in OL/high-school girls/salaried men, respectively. When coloring once

practiced is included, the rates come up to be 81%/67%/66%, respectively.

As for methods of coloring, bleach is largely used by high-school girls and salaried men. Hair manicure is largely used by high-school girls and OL. Hair color, hair dye, and bleach color are articles which are also largely used by OL. It is characteristic that rates of usages of temporary coloring products such as a color stick, a color spray, a gel, and a mascara are relatively high among high-school girls.

As for reasons for coloring, "enjoying fashionable hairs" and "black hairs look heavy" are raised by many high-school girls and OL, respectively. "Hoping to change personal atmosphere or image", and "for diversion" are raised by many people as a whole, and the last two reasons are substantially increasing in number particularly among salaried men.

From the results of the above consciousness survey, some knowledge can be obtained in that a habit of using the hair coloring products is steadily spreading among young generations.

When a trend of hair coloring products for household use for black hairs in the past three years is examined, a market size of mainstream bleaching products has not much changed. On the other hand, although the market size of the semi-permanent hair coloring products (hair manicure) which once was in expansion is now in a tendency of shrinking, the permanent hair

coloring products (bleach color) of hair color type which can give brilliant color tones to hairs is, instead, increasing in number. As other products than the above-described ones, those giving new types of color tones, such as recovering a natural color of hairs which were once colored bright, coloring hairs in a cold-type hue and coloring them in a blackish dark hue are increasing in their sales. In regard to temporary coloring which can easily be washed off by shampoo, new products were put on the market one after another in 1998. However, it seems at present that the market for them has not expanded as expected. (See FIG. 4).

As described above, hair coloring products have conventionally been used mainly by middle to aged persons, but usage among young generations has been expanding for the purpose of changing their hairs bright or actively changing them to colorful ones.

Even in the middle to aged persons who have conventionally used hair coloring products rather passively for the purpose of coloring their hairs in a same color as that of their own to conceal gray hairs, being reflected by a trend of making their hairs somewhat brighter as a whole, sales of hair coloring products having brighter color tones than before are increasing. Further, gray hair parts are colored in a color different from that of their own to finish their hairs up in a meshed appearance. In one or other ways, the middle to aged persons come to actively

use the hair coloring products and, along with this trend, types and forms or packagings of the hair coloring products are being diversified.

4. Fragrance of hair coloring product

4-1. Permanent hair coloring product

In 2-component-type hair coloring products, since hydrogen peroxide is compounded in the side of an oxidizing agent (a second component), fragrance is apt to be influenced by hydrogen peroxide and decomposed in storage. In order to avoid such influence, the fragrance is in most cases compounded in the side of a first component which is primarily composed of an alkaline agent and a dye intermediate. Since ammonia having a strong pungent odor is often used as the alkaline agent, there are points to be noticed at selecting the fragrance, namely, (1) stability in an alkaline system (pH: 8-11); and (2) masking effect of the pungent odor. If it is possible to reduce an amount of ammonia, the pungent odor can be suppressed. In fact, ammonia-free hair color products are available in the market. However, it is a present situation that products containing ammonia are many in number in the market.

From the standpoint of the stability in the alkaline system, since there are fragrances which are apt to be decomposed such as an ester-type compound or aldehydes, raw materials of fragrances to be usable are restricted to some extent. On the

other hand, as far as the masking of ammonia is concerned, a fragrance of fruity-type or green-type which is highly fragrant, and a raw material having a fresh light fragrance such as menthol, pine needle oil or lavender oil are relatively effective. A sweet fragrance of balsam-type is also effective in reducing the extent of the pungent odor. When it comes to select the fragrance which satisfies these conditions, it is necessary to use the fragrance while putting importance on functional aspects such as stability, a masking effect of a base material odor, and a highly fragrant property.

Fragrance tones of permanent hair coloring products for household use are summarized as shown in Tables 4 to 6. The mainstream of the fragrances is a floral-bouquet tone or a floral-green tone having a floral base tone. (See FIG. 5). Recently, there are many cases in which not only ammonia-free products, but also products appealing such features as "being less pungent odor", "soft fragrance", "being not stinging". In spring, 1999, a product such as "Paon quick coloring (Feminine)" which actively appeals a good fragrance such that it is not compounded with ammonia and is "a hair coloring product for gray hairs having a floral fragrance" was put on the market.

Since many of the hair coloring products for gray hairs has targeted at middle to aged people, they are based on a composed floral tone represented by Bigen cream tone (Hoyu).

The hair coloring products for black hairs targeting at

younger generations are represented by "Lavenus pure color (Kao)". Some products based on light fresh fragrance tone such as citrus or fruity can also be found. (See Table 6). Sala clear color (Kanebo) is based on same "Sala fragrance" as in shampoo and a styling product and is also on a same line of fragrance with a hair manicure and bleach. The "Sala fragrance" is a fragrance based on a fresh citrus floral tone. Further, Prostyle natural color (Kanebo) has a green feeling of orange flower type which is the same fragrance tone as that of the styling product.

4-2. Semi-permanent hair coloring product

In a so-called hair manicure, an alkaline agent or an oxidizing agent is not compounded. Since they have no pungent odor derived from ammonia, there is little problem of stability of a fragrance. However, in order to promote penetration of the fragrance into inside a hair, a solvent having a specific odor such as benzyl alcohol is often compounded.

The fragrance of the hair manicure has not much attracted people's attention and that of floral type which has an affinity with the solvent in regard to the odor has ordinarily been used. However, in spring, 1999, a product, such as Blaune super color (Kao), which puts stress more on the side of the fragrance such that it has little solvent odor and has a same fragrance with that of shampoo, namely, "delicate fragrance of flower garden"

was put on the market. (See Tables 7 and 8).

Such products as described above have a same tendency on the fragrance as that of the permanent hair coloring products. Those for gray hairs are relatively largely based on floral base while those for black hairs are largely based on the fragrance stressed on a citrus or fruity tone. (See FIG. 6).

4-3. Bleaching product (hair bleach)

Hair bleach belongs to a same brand as that of the color for black hairs and has an assortment of products: ordinary bleaching products and highly bleaching products, under the name of hi-bleach, which have a high bleaching effect. The hair bleach has same fragrance as that of the color for black hairs in many cases.

Products of pump mist type which are more convenient to use than those of other types are also available in the market. Since they do not contain ammonia as an alkaline agent, many of them scarcely have a pungent odor. The hair bleach is of a type which is used in a same manner as in the styling product, they fundamentally have a fragrance tone unified under a brand and is, in most cases, designed to be slightly fragrant or non-fragrant. (See Table 9 and FIG. 7).

4-4. Temporary hair coloring product

In many cases, temporary hair coloring products are used

for imparting an accent of color as a finishing touch after styling is performed and, in many cases, left on hairs as they are. Therefore, there are many products, being slightly fragrant or non-fragrant, in which their fragrance does not heavily remain in a same manner as in the styling product and the hair spray.

4-5. Summary of fragrance of hair coloring product

Conventionally, the hair coloring product has a strong ammonia odor and consumers have a perception that it irritates an eye or a nose. Accordingly, as to the fragrance, a stress has been put on its function, such as masking or alleviating a base material odor and factors of enjoying the fragrance as is seen in, for example, shampoo were scarcely found.

From around late 1980s, hair manicure for household use which does not contain ammonia has increased in number and, recently, techniques for reducing an amount of ammonia or making a product ammonia-free have been applied to products. By virtue of these techniques, it has become possible to shift an appeal for "an offensive odor is no more sensed" to a rather positive appeal for "a merit of fragrance" and, actually, some products start to adopt such shift.

5. Future direction of fragrance of hair coloring product

In recent years, chances in which consumers are conscious

of fragrance are increasing as is seen in, for example, growing herbs in the backyard, an aromatherapy/aromacology enthusiasm, and a fragrance museum and, accordingly, consumer's expectation or request for the fragrance is changing.

In the field of toiletries, not only products in which the fragrance is fresh, mild, or cosmetic, but also products in which the fragrance enhances consumer's mood or emotional part during or after the use of the fragrance are put on the market one after another.

It is considered that such tendency will be kept in future with a consumer's increasing expectation for some kind of function in the fragrance.

Consciousness survey on fragrances of coloring products was conducted by designating 200 women who have an experience of using a hair coloring product as subjects. The results are shown in FIG. 8.

From the above-described results, it is found that they use the coloring product while enduring its offensive odor but they hope it is improved. There are also many opinions that, although it is preferable that the odor is as little as possible, if the product has a good fragrance, they want to enjoy it positively. Accordingly, it is conceivable that there are needs in two directions roughly classified.

By the improvement of coloring techniques, odor of the base material has substantially been reduced. It can be said

that the fragrance of the hair coloring products is now proceeding from a stage of covering or alleviating the pungent odor to be "not conscious of a pungent or offensive odor" to a stage in which the fragrance of good quality, such as a natural fragrance, or those of flowers is positively appealed.

It goes without saying that functions inherent to the hair coloring products, such as coloring performance, small damage to hairs, and convenience to use are important, but, aiming for discrimination of products, possibility of proceeding in the direction of enjoying the fragrance more comfortably than before is considered to be one of additional factors in the same manner as in the shampoo.

Further, taking into consideration a comprehensive brand encompassing a variety of hair care products including the shampoo and styling product, from the standpoint of reinforcing brand identity, it will be important to unify fragrance tones of products including coloring products.

As for the fragrance tones, it is conceivable that a trend which puts a stress on a natural fruity or green tone which is based on the present floral tone will still be in the mainstream in the future. It is expected that the fragrance is diversified also in the direction of acting on the mood of consumers by the fragrance of natural type, such as herb, or more cosmetic fragrance.

On the other hand, when the coloring products are

considered to be included in decorative products in the same manner as in the styling products, as the offensive odor can be technically reduced more, consumers need for products being slightly fragrant or non-fragrant as is now seen with the styling products is expected to be increased more.

As described above, along with the reduction of the odor of the base material and diversification of products, it is conceivable that the way of fragrance to proceed will be polarized in a direction in which the fragrance is actively pushed forward and another direction in which a point is put on an appeal for no-smell.

In any event, a stage in which an effort is exerted on changing "odor" including that of the base material to be less offensive by all means has at last reached another stage in which "fragrance" itself can be discussed, and it is expected that a degree of attention to be put on the fragrance will become large in the future.

6. Closing

For writing this report, evaluations were made comprehensively on fragrances of hair coloring products which are available in the market. It was very difficult to make a judgment on delicate fragrances by simultaneously smelling the odors of respective base materials. There may be some inappropriate terms to express fragrance tones. Pointing out

such terms, if there is, and, also, any other comments would be appreciated.

Thanks to Mr. Hiroshi Shibata, Hair Care Research Center, Kao Corporation for his valuable technical information and advice.

It is expected that the world of the hair coloring products will be diversified in the sides of, for example, color tones, and forms (or packagings) of the products. Possibility of positively appealing to consumers fragrances which have so far had only a negative image is increasing.

From now on, as a researcher in the field of fragrances, I will be happy if I can continuously devote myself in developing a new product which consumers enjoy also on the side of the fragrance as well as the color tone and the convenience.

References

- 1) K. Hatakeyama, Hifu to Biyo (Skin and Beauty), 27 (4), 18 (1995);
- 2) Seiketsu na Kurashi no Kagaku (Science of Hygienic Life), Chap. Body, Life Science Research Center, Kao Corp. (now, Life Culture Research Center, Kao Corp.), pp. 52-55, (1995);
and
- 3) C&T, (4), 92, (1999)

Table 1

Kind and characteristics of hair coloring product

Kind		Main base material; coloring material	pH	Color retention	Base material odor	Characteristics
Permanent hair coloring product (quasi drug)	oxidative hair coloring product (hair color; hair dye)	oxidative dye; alkaline agent; oxidizing agent (hydrogen peroxide)	8-11 alkaline	2-3 months	strong pungent odor by ammonia	After dye intermediates penetrate into inside a hair, they turn, by being oxidized, to be a color-developing large molecule. Damage to hairs is large.
	bleaching product (hair bleach)	alkaline agent; oxidizing agent (hydrogen peroxide)	8-11 alkaline	permanent	strong pungent odor by ammonia	An oxidizing agent which is allowed to penetrate into inside a hair is activated by alkali to decompose melanin inside the hair. Damage to hairs is large.
Semi-perman ent hair coloring product (cosmetics)	hair manicure; color rinse; etc.	oxidative dye; organic solvent	3-4 acidic	2-4 weeks	no pungent odor; slight solvent odor	A dye penetrates into inside a hair to develop a color. Since the product is acidic, damage of hairs is small, there is a problem of coloring skin.
Temporary hair coloring product (cosmetics)	color spray; hair mascara; etc.	pigment; carbon black	-	easily washed off by shampoo	no pungent odor	A coloring material is adsorbed on a surface of a hair allowing a color of the hair to be conveniently changed without damaging the hairs.

Table 2

Difference between semi-permanent hair coloring product and
permanent hair coloring product

Classification	Dye	pH	Mechanism	Coloring
<u>Semi-permanent hair coloring product</u> Hair manicure; Color rinse	[oxidative dye] orange color No. 205; violet color No. 401; black color No. 401	acidic pH: 3-4	A dye penetrates into a hair surface layer and performs ionic bonding with an amino group of a hair. (D: dye)	Coloring only a surface layer inside a hair.
<u>Permanent hair coloring product</u>	[oxidative dye(dye intermediate)] p-phenylene diamine; p-aminophenol; toluene 2,5-diamine; resorcin; p-amino-o-cresol; m-phenylene diamine; etc.	neutral-al kaline pH: 6-10	After penetrating deep into inside a hair, the dye intermediates are bonded with each other by an oxidative reaction to become an insoluble pigment which is, then, fixed inside the hair. (color development) (blue color) Decoloring by hydrogen peroxide; Polymerization by hydrogen peroxide	Coloring up to inside a hair

Table 3

Amount of shipment of hair cosmetics (unit: 0.1 billion yen)

Article	1991	1992	1993	1994	1995	1996	1997	1998
Shampoo	1067 (101.3)	1140 (107.5)	1193 (104.5)	1297 (108.8)	1291 (100.0)	1272 (98.6)	1205 (94.7)	1188 (98.6)
Rinse	550 (105.4)	564 (102.5)	526 (93.4)	514 (97.6)	530 (103.1)	583 (109.9)	546 (93.8)	5065 (92.4) 09
Treatment	527 (109.2)	661 (102.5)	719 (108.7)	756 (105.2)	658 (88.7)	537 (81.6)	518 (96.5)	458 (89.0)
Liquid hairdressing	465 (124.9)	527 (111.8)	530 (100.6)	639 (120.6)	570 (89.3)	483 (84.6)	442 (91.5)	412 (93.2)
Hair coloring product	528 (108.5)	571 (107.7)	642 (112.4)	730 (113.8)	802 (109.9)	857 (106.8)	940 (109.7)	943 (100.4)

(% from the previous year)

(Data: MITI, Iron, Steel, and Chemical Industry Statistics Board)

Table 4

Fragrance of permanent hair coloring product (cream type)

Trade name	Maker	Fragrance tone
Bigen cream tone	Hoyu	Floral-Bouquet-Jasmine-Muguet
Ladies Bigen speedy	Hoyu	Floral-Bouquet(rose)-Green-Woody
Blaune quick coloring cream	Kao	Floral-Fruity-Green
Treatment color cream	Wella	Herbal-Lavender-Pine-Floral
Wellatone cream	Wella	Herbal-Lavender-Pine-Floral
Wellatone 2+1 cream	Wella	Floral-Muguet-Herbal-Citrus
Si Naturelle	L'Oreal	Floral-Green
First lady cream type	Kanebo	Floral-Green
Paon cream quick coloring	Feminine	Herbal-Floral
Tiara cream type	Shiseido	Floral-Fresh-Fruity
Cream hair color	Shiseido	Floral-Muguet

Table 5

Fragrance of permanent hair coloring product (liquid type)

Trade name	Maker	Fragrance tone
Bigen quick coloring liquid	Hoyu	Floral-Green
Bigen hair color	Hoyu	Floral-Bouquet
Cielo hair color foam	Hoyu	Floral-Bouquet
Bigen combing color	Hoyu	Floral-Bouquet
Fashion color quick coloring liquid	Kanebo	Fresh-Floral-Muguet-Green
Fashion color hard coloring	Kanebo	Fresh-Floral-Muguet-Green
First lady quick coloring liquid	Kanebo	Fresh-Green-Woody
Blaune quick coloring liquid	Kao	Floral-Fruit-Apple
Kao hair color	Kao	Floral-Green-Fruity
Wellatone liquid	Wella	Herbal-Lavender-Pine-Floral
Wellatone 2+1 liquid	Wella	Floral-Muguet-Herbal-Citrus
Paon quick coloring	Feminine	Fruity-Floral
Tiara liquid	Shiseido	Floral-Green-Fruity
Natural hair color	Shiseido	Floral-Bouquet

Table 6

Fragrance of permanent hair coloring product for black hair

Trade name	Maker	Fragrance tone
Prostyle natural color	Kanebo	Green-Floral-Orange flower
Beautylabo coloring foam	Hoyu	Citrus-Floral
Beauteen bleach color taiken (experience)	Hoyu	Green-Floral-Herbal
Freshlight bleach & color	Feminine	Citrus-Orange
Feria	L'Oreal	Floral-Green-Fruity
Lavenus pure color	Kao	Fruity-Apple

Table 7

Fragrance of semi-permanent hair coloring products for gray
hair (hair manicure)

Trade name	Maker	Fragrance tone
Blaune hair manicure	Kao	Floral-Fruity(Apple)-Green
Blaune super color	Kao	Floral-Bouquet-Fruity
Shikihatsu Kobo (Hair coloring workshop) hair manicure	Lion	Floral-Citrus-Fruity
Bigen hair color steadfast hair manicure	Hoyu	Floral-Citrus-Balsamic-Fruity
Bigen hair manicure	Hoyu	Floral-Green-Fruity Slightly fragrant type
Cielo hair manicure gel	Hoyu	Floral-Green-Woody Slightly fragrant type

Table 8

Fragrance of semi-permanent hair coloring product for black
hair

Trade name	Maker	Fragrance tone
Salon De Pro creamy hair manicure	Dariya	Fruity-Green-Apple-Floral
Lavenus hair manicure	Kao	Fruity-Fresh-Floral
Beautylabo hair manicure	Hoyu	Floral-Fresh
Sala natural manicure	Kanebo	Citrus-Floral-Musky

Table 9

Fragrance of hair bleaching product

Trade name	Maker	Fragrance tone
<u>Bleach</u>		
Beauteen treatment bleach	Hoyu	Floral-Green
Beautylabo	Hoyu	Citrus-Fruity
Freshlight hi-treatment bleach	Feminine	Citrus-Green-Orange flower
Palty natural bleach	Dariya	Floral-Bouquet-Green
Prostyle tsuyatsuya (glossy-glossy) bleach	Kanebo	Floral-Rose-Green-Woody
Bleacher liquid/cream	Shiseido	Floral-Green
Lavenus	Kao	Fruity-Apple-Floral
<u>Hi-bleach</u>		
Beauteen treatment hi-bleach	Hoyu	Floral-Green
Beautylabo hi-bleach	Hoyu	Citrus-Fruity
Freshlight hard bleach	Feminine	Citrus-Green-Orange flower
Palty hi-bleach	Dariya	Floral-Bouquet-Green
Salon De Pro hi-treatment bleach	Dariya	Floral-Green-Orange flower
Feria ammonia non-compounded bleach	L'Oreal	Floral-Green
Lavenus hi-bleach	Kao	Fruity-Apple-Floral
<u>Mist type</u>		
Beauteen treatment hi-bleach mist	Hoyu	Citrus-Green
Freshlight hi-treatment bleach mist	Feminine	Floral-Green-Orange flower
Freshlight hard bleach mist	Feminine	Floral-Green-Orange flower
Prostyle tsuyatsuya (glossy-glossy) foam bleach	Kanebo	No-smell
Bleacher bleach mist	Shiseido	Floral-Green

FIG. 1

Mechanism of permanent hair coloring product

First component (dye intermediate plus alkaline agent):

An alkaline agent swells a hair to allow a dye intermediate and an oxidizing agent to penetrate into inside the hair.

Second component (oxidizing agent):

The second component decolors a melanin pigment in a hair and bonds dye intermediates with each other to form a color-developing large molecule which is, then, fixed inside the hair.

染色前: before coloring

メラニン: melanin

キューティクル: cuticle

混合液の塗布: application of mixed liquid

染毛剤(強アルカリ): hair coloring product (strong alkali)

染料中間体(水溶性): dye intermediate (water-soluble)

酸化剤: oxidizing agent

膨潤: swelling

毛髪の膨潤と染料中間体／酸化剤の浸透: swelling of hair and penetration of dye intermediate/oxidizing agent

酸化剤 : oxidizing agent

染料中間体 : dye intermediate

酸化剤の働きで染料中間体同士が結合 : Dye intermediates are bonded with each other by an action of an oxidizing agent.

酸化剤の働きでメラニンを脱色 : Melanin is decolored by an action of an oxidizing agent.

酸化 : Oxidation

毛髪の脱色と発色 : bleaching and color-development of hair

[脱色] : bleaching

メラニンの分解 : decomposition of melanin

[発色] : color development

染料中間体の結合、不溶性 : Dye intermediates are bonded with each other to be insolubilized.

染料中間体の結合により発色／不溶化し毛髪内に定着 : Dye intermediates are bonded with each other to develop color/be insolubilized and, then, fixed inside a hair.

FIG. 2

Share by category of hair cosmetics

(MITI, Iron, Steel, and Chemical Industry Statistics Board)

頭髮用化粧品市場 : Market for hair cosmetics

4 6 4 5 億円 : 464.5 billion yen

(1 9 9 8 年) : (1998)

シャンプー : shampoo

リンス : rinse

トリートメント : treatment

染毛剤 : hair coloring product

液状整髪剤 : liquid hairdressing

ヘアトニック : hair tonic

ヘアスプレー : hair spray

その他 : others

FIG. 3

Transition of market size of hair coloring product for household
use

(Assumption by Kao Corp.)

億円 : 0.1 billion yen

市場規模 : market size

年度 : year

黒髪用 : for black hair

その他 : others

白髪用ヘアマニキュア : hair manicure for gray hair

白髪用カラー : coloring for gray hair

FIG. 4

Transition of market of hair coloring product for black hair
for household use by category
(Assumption by Kao Corp.)

億円 : 0.1 billion yen

市場規模 : market size

年度 : year

一時染め : temporary coloring

暗色化カラー : darkened color

(永久染毛) : (permanent coloring)

ヘアカラータイプ : hair color type

ヘアブリーチ : hair bleach

ヘアマニキュア : hair manicure

(半永久染毛) : (semi-permanent hair coloring product)

FIG. 5

Classification of fragrance tone of permanent hair coloring
product for household use

	HERBAL	FLORAL				CITRUS	FRUITY
		Citrus	Fruity	Green	Bouquet		
	Wellatone [Wella]	Feminine [Feminine]	Bigen quick coloring [Hoyu]	First lady [Kanebo]	Bigen hair color [Hoyu]	Paon quick coloring [Feminine]	
For gray hairs liquid type		Cielo hair color foam [Hoyu] Bigen combing color [Hoyu] Si Naturelle [L'Oreal]	Blaune quick coloring [Kao]	Fashion color [Kanebo] Tiara [Shiseido] Wellatone 2+1 [Wella] Kao hair color [Kao]	Natural hair color [Shiseido]		
	Treatment color [Wella]		Blaune quick coloring [kao]	First lady [Kanebo]	Ladies Bigen speedy [Hoyu]		
For gray hairs Cream type	Wellatone [Wella]		Tiara [Shiseido]		Bigen cream tone [Hoyu]		
	Paon cream quick coloring [Feminine]			Wellatone 2+1 [Wella]	Cream hair color [Shiseido]		
		Sala clear color [Kanebo]	Feria treatment bleach & color [L'Oreal]	Prostyle natural color [Kanebo]		Freshlight [Feminine]	Lavenus pure color [Kao]
Bleach & color for black hairs		Beautylabo [Hoyu]		Beauteen bleach color taiken (experience)			

FIG. 6

Classification of fragrance tone of semi-permanent hair
coloring products for household use

	HERBAL	FLORAL				CITRUS	FRUITY
		Citrus	Fruity	Green	Bouquet		
		Shikihatsu Kobo (Hair coloring workshop) hair manicure [Lion]	Blaune hair manicure [Kao]	Cielo hair manicure gel [Hoyu]	Blaune super color [Kao]		
For gray hairs		Bigen hair color steadfast hair manicure [Hoyu]					
For black hairs		Sala natural hair manicure [Kanebo]		Salon De Pro creamy hair manicure [Dariya]	Beautylabo hair manicure [Hoyu]		Lavenus hair manicure [Kao]

FIG. 7

Classification of fragrance tone of hair bleaching product for
household use

	HERBAL	FLORAL				CITRUS	FRUITY
		Citrus	Fruity	Green	Bouquet		
		Beautylabo bleach [Hoyu]		Prostyle tsuyatsuya (glossy-glossy) bleach [Kanebo] Bleacher (liquid/cream) [Shiseido] Beauteen bleach taiken (experience) [Hoyu] Freshlight hi-treatment bleach [Feminine]	Palty natural bleach [Dariya]		Lavenus bleach [Kao]
Bleach							
		Beautylabo hi-bleach [Hoyu]		Beauteen hi-bleach taiken (experience) [Hoyu]	Palty hi-bleach [Dariya] Freshlight hard bleach [Feminine] Feria ammonia non-compoun ded bleach [L'Oreal]		Lavenus hi-bleach [Kao]
Hi-Bleach							

FIG. 8

Consciousness of fragrance of hair color

(Survey conducted by Kao: 200 women having an experience in
use of hair color)

カラーリング剤のにおいはくさいと思う :

I think coloring products smell bad.

カラーリング剤のにおいはできるものなら何とかして欲しい :

I hope the odor of coloring products should be improved anyhow.

カラーリング剤のにおいは仕方がないと思う :

I think I must just accept the odor of the coloring product
as it is.

もっと香りがよくなったらカラーリングは楽しくなると思う :

I think coloring work will be more enjoyable if the smell is
improved.

カラーリング剤のにおいはできるだけないほうが好ましい :

It is preferable that odor of the coloring product is as little
as possible.

においが嫌いでカラーリング剤の使用を中止したことがある :

Because of an offensive odor, I once stopped using a coloring

product.

カラーリング剤は香りがよければ、放置時間はリラックスできる：

If a coloring product has a good smell, I can be relaxed during a time in which the applied coloring product is left to stand.

もしカラーリング剤によい香りがついていたら、もっと積極的にカラーリング中に香りを楽しめると思う：

If coloring products have a good fragrance, I think I can enjoy the fragrance during coloring work more actively.

カラーリング剤のにおいがなくなれば、放置時間にいろいろと他のことができる：

If odor of a coloring product is improved, I can make use of the time in which the applied coloring product is left to stand.

そう思う：

Yes, I think so.

少しそう思う：

Yes, I think so a little.

どちらともいえない：

I cannot say Yes or No.

あまりそう思わない :

I less think so.

そう思わない :

No, I don't think so.